

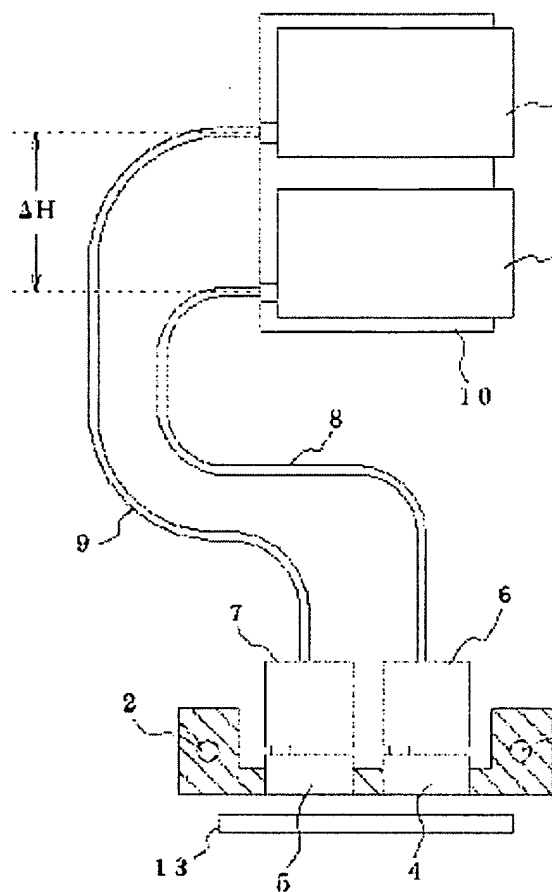
INK JET RECORDING APPARATUS

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Abstract of JP2002036583

PROBLEM TO BE SOLVED: To prevent lowering of printing quality caused by head difference in such a case that an ink cartridge is arranged in an up and down direction.

SOLUTION: Valve mechanisms opened corresponding to the negative pressure generated by the consumption of the ink of recording heads 4 and 5 are connected across the recording heads 4 and 5 and ink supply tubes 8 and 9 and the difference pressure at the time of opening of the valve mechanisms is set corresponding to the height difference ΔH of the ink cartridge.



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CLAIMS

[Claim(s)]

[Claim 1] The ink-jet recording device by which the differential pressure at the time of valve opening of the aforementioned valve system is set as it corresponding to the difference of elevation of the aforementioned ink cartridge in the ink-jet recording device which arranges two or more ink cartridges in the vertical direction, and supplies ink to a recording head through an ink supply way while connecting the valve system which opens according to the negative pressure generated by consumption of the ink of the aforementioned recording head between the aforementioned recording head and an ink supply way.

[Claim 2] The ink-jet recording device according to claim 1 included in the buffer tank formed in the carriage with which the aforementioned valve system carried the aforementioned recording head.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The field of the technology in which invention belongs] this invention relates to the ink-jet recording device which prints while supplying ink to a recording head by the ink supply tube from a main tank.

[0002]

[Description of the Prior Art] The ink-jet recording device which prints in the big record form of the size of a poster etc. is constituted so that ink may be supplied to the recording head of each color of carriage through an ink supply tube, respectively from the ink cartridge of each color prepared in the main part of equipment. These recording heads are arranged so that it may be located on the same horizontal line. For this reason, the space which can hold a recording head crosswise [of a record form] is needed, and there is a problem that crosswise size becomes large so that the recording head arranged in the side can also print the edge of a record form.

[0003]

[Problem(s) to be Solved by the Invention] Although arranging a recording head in the direction perpendicular to the move direction of carriage is also considered in order to solve such a problem, since a recording head is located in a line in the vertical direction, the water head difference between the ink cartridges arranged horizontally arises, dispersion arises in the ink supply pressure to each recording head, and there is a problem that a quality of printed character deteriorates. The place which this invention is made in view of such a problem, and is made into the purpose is supplying ink to the recording head arranged in the vertical direction by the equal pressure, and offering the ink-jet recording device in which printing by the high quality of printed character is possible.

[0004]

[Means for Solving the Problem] In order to attain such a technical problem, while connecting the valve system which opens according to the negative pressure generated by consumption of the ink of the aforementioned recording head between the aforementioned recording head and an ink supply way, in this invention, the differential pressure at the time of valve opening of the aforementioned valve system is set as it corresponding to the difference of elevation of the aforementioned ink cartridge in the ink-jet recording device which arranges two or more ink cartridges in the vertical direction, and supplies ink to a recording head through an ink supply way.

[0005]

[Function] The water head difference between ink cartridges is compensated by the differential pressure valve system, and ink is supplied to a recording head by the uniform pressure.

[0006]

[Embodiments of the Invention] Then, based on the example illustrating the detail of this invention, it explains below. that drawing 1 indicates one example of the ink-jet recording device of this invention to be -- it is -- a guide -- in plurality and this example, two recording heads 4 and 5 are arranged horizontally at the carriage 3 supported possible [movement to members 1 and 2] The buffer tanks 6 and 7 mentioned later are connected to each recording heads 4 and 5, respectively, and supply is

received for the ink consumed by printing from each buffer tank 6 and 7.

[0007] The buffer tanks 6 and 7 are connected to the ink cartridges 11 and 12 held in the vertical direction by the cartridge rack 10 through the ink supply tubes 8 and 9, respectively. In addition, the sign 13 in drawing shows the platen which supports a record form.

[0008] The tap hole 23 which drawing 2 takes an example on one buffer tank 6, shows one example of the above-mentioned buffer tank to it, and the end connection 22 of the ink supply tube 8 is formed in the upper part of the case 21 which constitutes the ink stockroom 20, and supplies ink to the lower part at a recording head 4 is formed.

[0009] Between the tap hole 23 and the ink stockroom 20, the valve system 24 which can adjust differential pressure is formed. It is constituted by the valve element 27 which the valve system 24 was always energized with the spring 25 at the ink stockroom 20 side as shown in the drawing 3 (b) and a (b), and equipped the center with the breakthrough 26, and the valve seat 28 which closes the breakthrough 26 of a valve element 27, and through the through-hole 29, one field of a valve element 27 is constituted by the ink stockroom 20 again so that the field of another side may be open for free passage through a through-hole 30 at a tap hole 23.

[0010] By the way, as shown in drawing 1, since it is arranged in the vertical direction and difference-of-elevation ΔH exists, an ink cartridge 11 and an ink cartridge 12 set up the spring 25 of the valve system 24 of the buffer tank 7 connected to these recording heads 4 and 5 so that the suppression force may become strong by the head corresponding to difference-of-elevation ΔH .

[0011] In this example, if it equips with ink cartridges 11 and 12, the ink of ink cartridges 11 and 12 will flow into the buffer tanks 6 and 7 according to a siphon phenomenon through the air run through-hole which it was formed in ink cartridges 11 and 12, and is not illustrated through the ink supply tubes 8 and 9. As for the ink of the ink stockroom 20 of the buffer tank 7, only in difference-of-elevation ΔH , a pressure becomes high rather than the ink of the ink stockroom 20 of the buffer tank 6 between two buffer tanks.

[0012] If ink is consumed by printing etc. by recording heads 4 and 5 in this state, since the pressure of the tap hole 23 of the buffer tanks 6 and 7 will decline, as a valve element 27 resists the energization force of a spring 25 and it was shown in the drawing 3 (b), it separates from a valve seat 28, and the ink of the ink stockroom 20 flows into recording heads 4 and 5 from a through-hole 26.

[0013] Thus, if ink flows into recording heads 4 and 5 until it is in agreement with the differential pressure set up with the spring 25 of each buffer tank, the valve element 27 of each buffer tanks 6 and 7 will be overcome by the energization force of a spring 25, and will be ****(ed) by the valve seat 28, and passage will close.

[0014] Thereby, a recording head 5 can receive supply of ink by the same pressure as a recording head 4 regardless of a recording head 4 and difference-of-elevation ΔH of a between.

[0015] Moreover, during a non-printing period, since the valve element 27 of the buffer tanks 6 and 7 is ****(ed) by the valve seat 28 according to the energization force of a spring 25 and blockades passage, even if the porosity material for ink absorption is not held in ink cartridges 11 and 12, the leakage appearance of the ink from recording heads 4 and 5 will be prevented.

[0016] In addition, in an above-mentioned example, although the valve system for water head difference compensation is included in the buffer tank, even if it connects with the ink supply tubes 8 and 9 and prepares a valve system in the cartridge rack 10, it is clear to do the same operation so.

[0017] When the head by the difference of elevation of the ink cartridge 11 and recording head 4 which have been arranged in the low place does not exert un-arranging on a recording head 4 So that water head difference ΔH of the ink cartridge 12 arranged at the height side and the ink cartridge 11 by the side of a low place may be compensated It is made to build only in the buffer tank 7 which contained the valve system for water head difference compensation only in the recording head 5 which receives supply of ink from the ink cartridge 12 by the side of a height. Moreover, the same operation is done so even if it connects buffer tank 6' equipped only with the ink stockroom 20 to the recording head which receives supply of ink from the ink cartridge 11 by the side of a low place.

[0018] Moreover, although the case where two ink cartridges had been arranged in the vertical direction

in an above-mentioned example was explained, when the ink cartridge has been arranged in three or more steps and the vertical direction, it is clear by arranging the valve system for water head difference compensation, and connecting so that differential pressure with the recording head of low ink ** may be compensated most to do the same operation effect so.

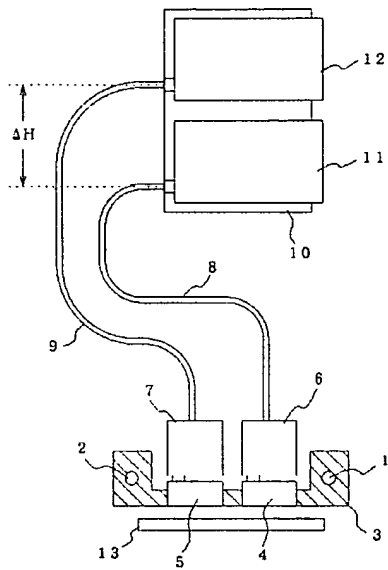
[0019] Furthermore, in an above-mentioned example, although the case where a cartridge was installed in a housing was explained, it is also applicable to a case so that plurality 20, for example, the cartridge for black ink, and the ink cartridge 21 for color ink may be carried in the vertical direction at the carriage 3 with which the recording head 24 is formed. In such a case, if the differential pressure valve systems 25 and 26 which were mentioned above between each ink supply needles 22 and 23 and recording head 24 are infixed, the pressure differential of the inconvenience resulting from the difference of elevation between cartridges, i.e., the ink which acts on a recording head 24, can be lost.

[0020]

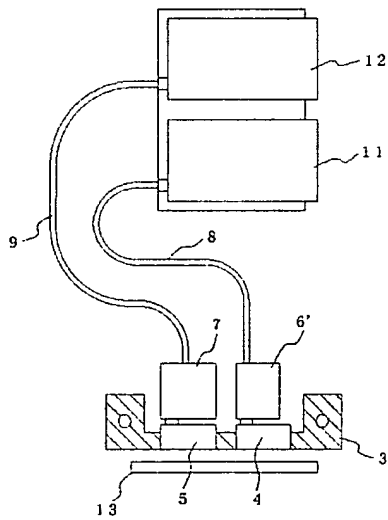
[Effect of the Invention] Since the differential pressure at the time of valve opening of a valve system is set as it corresponding to the difference of elevation of an ink cartridge while connecting the valve system which opens according to the negative pressure generated by consumption of the ink of a recording head between a recording head and an ink supply way as the above was explained, a water head difference is compensated by the valve system, and by the uniform pressure, ink is supplied to each recording head and it becomes it printable at a high quality of printed character.

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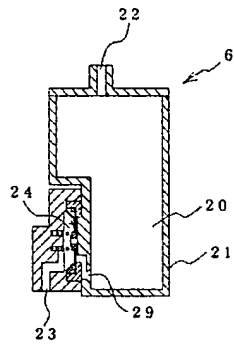
【図1】



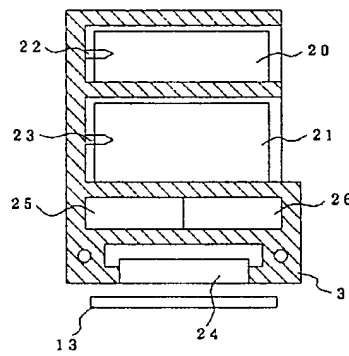
【図4】



【図2】



【図5】



【図3】

